Facility Specific Chloride Variance Data Sheet

Directions: Please complete this form electronically. Record information in the space provided. Select checkboxes by double clicking on them. Do not delete or alter any fields. For citations, include page number and section if applicable. Please ensure that all data requested are included and as complete as possible. Attach additional sheets if needed.

Section I: General Information

A. Name of Permittee: Village of Cedar Grove

B. Facility Name: Cedar Grove Wastewater Treatment Facility

C. Submitted by: Wisconsin Department of Natural Resources

D. State: Wisconsin **Substance:** Chloride **Date completed:** 8-23-2019

E. Permit #: WI-0020711-09-0 **WQSTS #:** (EPA USE ONLY)

F. Duration of Variance **Start Date:** 04-01-2020 **End Date:** 3-31-2025

G. Date of Variance Application: 5-2-2019

H. Is this permit a:
☐ **First time submittal for variance**
☒ **Renewal of a previous submittal for variance** *(Complete Section IX)*

I. Description of proposed variance:
Variance for chloride from the water quality based effluent limits of 400 mg/L, expressed as a weekly average limit, to an interim limit of 530 mg/L year-round. The permit will include requirements to implement source reduction measures and a target value of 480 mg/L year-round.

J. List of all who assisted in the compilation of data for this form

Name	Email	Phone	Contribution
Lisa Creegan	Lisa.creegan@wi.gov	414-263-8701	All sections
Curt Nickels	Curtis.Nickels@wi.gov	920 893-8530	Sec. II, IV, VIII, IX, and X.
Nicole Krueger	Nicole.Krueger@wi.gov	414-263-8650	Section II (D-H, K-L), III (E-F), VII & WQBEL memo

Section II: Criteria and Variance Information

A. Water Quality Standard from which variance is sought: Chloride

B. List other criteria likely to be affected by variance: None

C. Source of Substance: Primarily from residential water softeners, commercial water softeners, and winter road salt operations.

D. Ambient Substance Concentration: Zero ☐ **Measured** ☒ **Estimated** ☐ **Default** ☐ **Unknown**

E. **If measured or estimated, what was the basis? Include citation.** There is no background concentration data for Barr Creek. The low flow rates are much lower compared to the effluent flow rate, so the ambient chloride concentration would have little impact.

F. Average effluent discharge rate: 0.18 MGD **Maximum effluent discharge rate:** 0.75 MGD

G. Effluent Substance Concentration: 1-day P99 = 665 mg/L; 4-day P99 = 528 mg/L; Mean = 413 mg/L ☒ **Measured** ☐ **Estimated** ☐ **Default** ☐ **Unknown**

If measured or estimated, what was the basis? Include Citation. Effluent data from the current permit term (November 2014 to April 2019) was used to calculate the average concentration of 413 mg/L. The 4-day P99 is 528 mg/L.

I. Type of HAC:
☐ **Type 1: HAC reflects waterbody/receiving water conditions**
☐ **Type 2: HAC reflects achievable effluent conditions**
☒ **Type 3: HAC reflects current effluent conditions**

J. Statement of HAC: The Department has determined the highest attainable condition of the receiving water is achieved through the application of the variance limit in the permit, combined with a permit requirement that the permittee implement its Chloride SRM plan. Thus, the HAC at commencement of this variance is 530 mg/L, which reflects the greatest chloride reduction achievable with the current treatment processes, in conjunction with the implementation of the permittee's Chloride SRM plan. The current effluent condition is reflective of on-site optimization measures that have already occurred.

K. Variance Limit: 530 mg/L as a weekly average, year-round limit

L. Level currently achievable (LCA): 528 mg/L.

M. What data were used to calculate the LCA, and how was the LCA derived? (*Immediate compliance with LCA is required.)*

The LCA value shown above is the 4-day P99 of effluent data collected during the current permit term, from November 2014 through April 2019. It is rounded to two significant figures.

N. Explain the basis used to determine the variance limit (which must be ≤ LCA). Include citation.

Chapter NR 106, Subchapter IV, Wis. Adm. Code, allows for a variance; the imposition of a less restrictive interim limit; a compliance schedule that stresses source reduction and public education; and allowance for a target value or limit to be a goal for reduction.

O. Select all factors applicable as the basis for the variance provided under 40 CFR 131.10(g). Summarize justification below: ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☒ 6

The use of a reverse osmosis system was evaluated. The cost of the reverse osmosis treatment system was estimated to result in an average that would be about 4.40% of the MHI. Installing centralized lime softening on the current municipal water supply system was also evaluated, and the estimated cost of doing so would be about 8.62% of the MHI. The cost estimates are in the range in which the application of either treatment would be expected to result in substantial and widespread economic and social impacts to the community. Without a variance, meeting the water quality standard of 400 mg/L would result in substantial and widespread economic and social impacts.

Section III: Location Information

A. Counties in which water quality is potentially impacted: Sheboygan County

B. Receiving waterbody at discharge point: Barr Creek

C. Flows into which stream/river? Lake Michigan **How many miles downstream?** Lake Michigan is 1.5 miles downstream.

D. Coordinates of discharge point (UTM or Lat/Long): 43.5779N, -87.8077W

E. What is the distance from the point of discharge to the point downstream where the concentration of the substance falls to less than or equal to the chronic criterion of the substance for aquatic life protection?

1.5 miles to Lake Michigan.

F. Provide the equation used to calculate that distance *(Include definitions of all variables, identify the values used for the clarification, and include citation):*

There are not other dischargers to Barr Creek before reaching Lake Michigan, so it is assumed that the chronic criterion wouldn't be met until reaching the lake. The dilution when it reaches the lake is 10:1 so the chronic toxicity criterion of 395 mg/L would be met then.

G. What are the designated uses associated with the direct receiving waterbody, and the designated uses for any downstream waterbodies until the water quality standard is met?

Limited Aquatic Life for 1.5 miles in Barr Creek before confluence with Lake Michigan which is designated as a cold-water community.

H. Identify all other variance permittees for the same substance which discharge to the same stream, river, or waterbody in a location where the effects of the combined variances would have an additive effect on the waterbody: None.

Permit Number	Facility Name	Facility Location	Variance Limit [mg/L]
N/A	N/A	N/A	N/A

I. Please attach a map, photographs, or a simple schematic showing the location of the discharge point as well as all variances for the substance currently draining to this waterbody on a separate sheet

J. Is the receiving waterbody on the CWA 303(d) list? If yes, please list the impairments below. ☐ **Yes** ☒ **No** ☐ **Unknown**

River Mile	Pollutant	Impairment
N/A	**N/A**	**N/A**

***K.* Please list any contributors to the POTW in the following categories:**

Food processors (cheese, vegetables, meat, pickles, soy sauce, etc.)	**N/A**
Metal Plating/Metal Finishing	**N/A**
Car Washes	**AKA Station**
Municipal Maintenance Sheds (salt storage, truck washing, etc.)	**Salt storage November through March, truck washing**
Laundromats	**N/A**
Other presumed commercial or industrial chloride contributors to the POTW	**N/A**

L. If the POTW does not have a DNR-approved pretreatment program, is a sewer use ordinance enacted to address the chloride contributions from the industrial and commercial users? If so, please describe.
No. The Village of Cedar Grove is too small to have a local pretreatment authority (design flow < 5 MGD). The Village is working with local schools and hospitals to ensure a minimized discharge to the collection system.

Section IV: Pretreatment (complete this section only for POTWs with DNR-Approved Pretreatment Programs. See w:\Variances\Templates and Guidance\Pretreatment Programs.docx)

A. Are there any industrial users contributing chloride to the POTW? If so, please list.
N/A

B. Are all industrial users in compliance with local pretreatment limits for chloride? If not, please include a list of industrial users that are not complying with local limits and include any relevant correspondence between the POTW and the industry (NOVs, industrial SRM updates and timeframe, etc)
N/A

C. When were local pretreatment limits for chloride last calculated?
N/A

D. Please provide information on specific SRM activities that will be implemented during the permit term to reduce the industry's discharge of the variance pollutant to the POTW
N/A

Section V: Public Notice

A. Has a public notice been given for this proposed variance? ☐ **Yes** ☐ **No**

B. If yes, was a public hearing held as well? ☐ **Yes** ☐ **No** ☐ **N/A**

C. What type of notice was given?
☐ **Notice of variance included in notice for permit** ☐ **Separate notice of variance**

D. Date of public notice: _____ **Date of hearing:** _____

E. Were comments received from the public in regards to this notice or hearing? *(If yes, see notice of final determination)* ☐ **Yes** ☐ **No**

Section VI: Human Health

A. Is the receiving water designated as a Public Water Supply? ☐ **Yes** ☒ **No**

B. Applicable criteria affected by variance: No human health criteria for chloride

C. Identify any expected impacts that the variance may have upon human health, and include any citations:
None

Section VII: Aquatic Life and Environmental Impact

A. Aquatic life use designation of receiving water: Limited aquatic life, cold water community 1.5 miles downstream

B. Applicable criteria affected by variance: 395 mg/L is the chronic toxicity for chloride per ch. NR 105.

C. Identify any environmental impacts to aquatic life expected to occur with this variance, and include any citations:
Due to the low flow of the receiving water, it is assumed that with the interim limit of 530 mg/L, the instream concentration below the outfall is also about 530 mg/L. This exceeds the genus chronic value for Ceriodaphnia, which is 417 mg/L.

D. List any Endangered or Threatened species known or likely to occur within the affected area, and include any citations: None that would affect the water quality criterion, as the chronic toxicity criterion for chloride is more stringent than all genera mean chronic values for organisms with chloride toxicity data. As a result, no endangered species with data would need more protection than already provided by the existing criterion.

Section VIII: Economic Impact and Feasibility

A. Describe the permittee's current pollutant control technology in the treatment process: Wastewater treatment processes include fine screening, grit removal, sequential batch reactors, anthracite filters, and reaeration.

B. What modifications would be necessary to comply with the current limits? Include any citations.
Upgrades to the WWTF to install reverse osmosis (RO) would be needed to comply with the WQBEL of 400 mg/L. Regional lime softening is currently not an option due to costs associated with centralizing well water from the remaining 1,048 households with private wells that would need to be hooked up to the system. The current municipal water supply has 290 service connects.

C. How long would it take to implement these changes?
A time determination was not completed due to the infeasibility of treatment for chlorides.

D. Estimate the capital cost *(Citation)***:** $450,000

E. Estimate additional O & M cost *(Citation)***:** $146,000

F. Estimate the impact of treatment on the effluent substance concentration, and include any citations:
Treatment for chlorides at the plant without an RO system would have little impact. Proper implementation of SRMs is anticipated to reduce the current effluent chloride concentrations by 10%. In order to meet the final water quality-based effluent limit of 400 mg/L the current effluent concentration would need to be reduced by 30%.

G. Identify any expected environmental impacts that would result from further treatment, and include any citations:
End-of-pipe RO wastewater treatment technology for chloride produces concentrated brine that can be as much or more of an environmental liability than the untreated effluent. Since the concentrated brine cannot be further treated, the only recourse for the disposal of the brine is transfer to another community, which is often not feasible. Appropriate chloride source reduction activities are preferable environmentally to effluent end-of-pipe treatment in most cases, since the end product of treatment (production of a concentrated brine) does not remove the load of chloride from the environment. There would be some impacts based on disposal of brine from RO. These include air pollution impacts from trucking brine and increased chloride impacts at the point where brine is discharged.

H. Is it technically and economically feasible for this permittee to modify the treatment process to reduce the level of the substance in the discharge? ☐ Yes ☒ No ☐ Unknown

Reverse Osmosis treatment of the Village of Cedar Grove WWTP effluent to meet the WQBEL is technically feasible, however, it is not economically feasible. See DNR variance application and screening tool for costs of reverse osmosis. Use of reverse osmosis at the WWTF was evaluated; the resulting total cost for sewer user rates was estimated to result in an average cost to households that would be 4.40% of the MHI. An increase of this magnitude would cause substantial and wide spread adverse social and economic impacts the area where the discharge is located.

Lime softening treatment of the Village of Cedar Grove's water supply – in lieu of ion-exchange is technically feasible and would potentially enable the WWTP effluent to meet the chloride WQBEL. However, lime softening is not economically feasible. See the Chloride Variance Economic Eligibility Tool (Lime Softening) screening tool for costs of lime softening. Use of municipal lime softening was evaluated; the resulting cost for sewer user rates was estimated to result in an average cost to households that would be 8.62% of the MHI. An increase of this magnitude would cause substantial and wide spread adverse social and economic impacts the area where the discharge is located.

I. If treatment is possible, is it possible to comply with the limits on the substance? ☒ Yes ☐ No ☐ Unknown

J. If yes, what prevents this from being done? Include any citations.

End of pipe Reverse Osmosis (RO) treatment could reduce effluent chloride concentrations to chronic toxicity criterion. However, attaining the applicable water quality standards specified in chs. NR 102 to 105, Wis. Adm. Code, may cause substantial and widespread adverse social and economic impacts in the community where the discharger is located.

K. List any alternatives to current practices that have been considered, and why they have been rejected as a course of action, including any citations:

Reverse Osmosis (RO)-not economically feasible (4.40% of MHI)

Regional Lime Softening Treatment- not economically feasible (8.62% of MHI)

Section IX: Compliance with Water Quality Standards

A. Describe all activities that have been, and are being, conducted to reduce the discharge of the substance into the receiving stream. This may include existing treatments and controls, consumer education, promising centralized or remote treatment technologies, planned research, etc. Include any citations.

Cedar Grove continues to identify sources and educate homeowners as to the benefits of upgrading to a demand-based softener. They continue to work with DPW to properly calibrate road salt trucks.

B. Describe all actions that the permit requires the permittee to complete during the variance period to ensure reasonable progress towards attainment of the water quality standard. Include any citations.

The permit contains a variance to the water quality-based effluent limit (WQBEL) for chloride granted in accordance with s. NR 106.83(2), Wis. Adm. Code. As conditions of this variance the permittee shall (a) maintain effluent quality at or below the interim effluent limitation specified in the permit, (b) implement the chloride source reduction measures specified below, (c) follow the approved Source Reduction Plan and (d) perform the actions listed in the compliance schedule. A five-year compliance schedule was specified to provide the permittee adequate time to complete the items outlined below.

1. Continue to provide education to residents and businesses on the effects of excessive chloride use and the role of water softeners by providing information on the Village website, in the Village newsletter, and in Village brochures.

2. Explore adoption of a local regulation to require Demand Initiated Regeneration (DIR) water softeners for new installations and replacements and present to Village Board.

3. Explore adoption of a local regulation to require bypass of water softener systems for outside hose-bib use such as for landscape irrigation and present to Village Board.

4. Complete a chloride source investigation. Continue to collect samples from the system, including commercial and hauled waste customers, for high chloride discharges. Include both low-volume and high-volume water users.

5. Gather data regarding softener use in the Village by updating and administering the Cross Connection survey.

6. Contact the largest water users in the Village, including schools, hospitals, and apartment complexes. Provide information on softener regeneration optimization, brine reclamation systems, and responsible use of softened water connections.

7. Continue to take actions that prevent chloride from reaching the sewer system. Find and correct inflow and infiltration issues by investigating sources, repairing manholes, and following CMOM guidelines.

8. Educate DPW drivers on salt and brine use, efficient application, and cleanup procedures prior to snow season.

Section X: Compliance with Previous Permit *(Variance Reissuances Only)*

A. Date of previous submittal: 6-12-2014 **Date of EPA Approval:** 8-14-2014

B. Previous Permit #: WI-0020711-08-0 **Previous WQSTS #:** (EPA USE ONLY)

C. Effluent substance concentration: 4-day P99 = 536 mg/L **Variance Limit:** 540mg/L

D. Target Value(s): 486 mg/L **Achieved?** ☐ **Yes** ☒ **No** ☐ **Partial**

E. For renewals, list previous steps that were to be completed. Show whether these steps have been completed in compliance with the terms of the previous variance permit. Attach additional sheets if necessary.

Condition of Previous Variance	Compliance
1. Continue to identify sources.	☒ **Yes** ☐ **No**
2. Continue to educate homeowners and options available.	☒ **Yes** ☐ **No**
3. Mandate DIR softeners for new buildings by updating sewer use ordinance.	☐ **Yes** ☒ **No**
4. Educate licensed installers benefits of having outside hose bibs as non-softened water.	☒ **Yes** ☐ **No**
	☐ **Yes** ☐ **No**